Long-Term Outcomes of Iris-sutured Posterior Chamber Intraocular Lenses in Children

RAVI SHAH, MITCHELL P. WEIKERT, CHARITY GRANNIS, MARSHALL B. HAMILL, LINGKUN KONG, AND KIMBERLY G. YEN

• PURPOSE: To report the long-term outcomes and complications of iris-sutured posterior chamber intraocular lenses (PCIOLs) in the pediatric population.
• DESIGN: Retrospective interventional case study.
• METHODS: This study involved 12 consecutive pediatric patients (17 eyes) who underwent placement of foldable iris-sutured PCIOLs between September 2004 and September 2007. Outcome measures included change in visual acuity and complications.
• RESULTS: Of the 17 eyes were reviewed, 6 (35%) had hereditary or idiopathic ectopia lentis, 5 (29%) had Marfan syndrome, 2 (12%) were aphakic after pars plana vitrectomy and 4 (24%) were aphakic after surgical intervention for trauma. Average follow-up was 4.69 ± 3.21 years and mean age of surgery was 7.21 ± 3.78 years. Seven eyes suffered dislocation of the PCIOL an average of 12.11 ± 11.97 months after surgery, with 2 patients undergoing dislocation a second time. There was a higher rate of dislocation in patients with a history of ectopia lentis due to Marfan syndrome, idiopathic causes, or hereditary causes than in patients being treated for aphakia resulting from other causes (71% vs 29%). Mean visual acuity improved in 12 of 17 patients (71%), from 0.80 ± 0.6 logMAR preoperatively to 0.35 ± 0.5 logMAR at most recent visit, $P = .009$. One eye of a Marfan patient sustained a retinal detachment 8 months after dislocation of the PCIOL, and 1 patient experienced iris capture of the PCIOL after surgery.
• CONCLUSIONS: Iris-sutured intraocular lenses have been used as an alternative to transsclerally sutured intraocular lenses to correct aphakia in pediatric patients. Dislocation of the intraocular lenses can occur frequently, however. The procedure should be considered with caution in pediatric patients. (Am J Ophthalmol 2016;161:44–49. © 2016 by Elsevier Inc. All rights reserved.)

ALTHOUGH IN-THE-BAG PLACEMENT OF AN INTRAocular lens (IOL) is the preferred approach for refractive correction in cataract surgery, in pediatric patients there are a number of reasons why an IOL may not be placed at the time of surgery and the patient left aphakic. In some cases, lack of capsular support does not allow for an IOL. In other situations, the IOL is not placed owing to the patient's age. Correcting aphakia in children is a challenge but can be an important step to treating amblyopia. Current methods of correcting aphakia include nonsurgical treatments such as aphakic glasses or contact lenses. Because of aniseikonia and social issues, aphakic spectacles are not a preferred option. Contact lenses are usually prescribed as an alternative, but patients can become intolerant of contact lenses over time or desire an IOL.

Sulcus-fixated IOLs are often placed to treat surgical aphakia, but are not an option if capsular support is absent. In the absence of capsular support, an anterior chamber lens, iris-fixated IOL, or scleral-fixated IOL are the remaining options. Patients with anterior chamber lenses may suffer from corneal decompensation, chronic inflammation, and glaucoma.[1,2] Scleral-sutured posterior chamber IOLs (PCIOL) in children can be associated with complications including corneal edema, wound leakage, suture degradation/breakage, hyphema, and ocular hypertension.[3–5] Complications of iris-sutured PCIOLs in children include dislocations and iris capture, but data for long-term outcomes are limited.[6]

Previously, we found that iris-sutured IOLs should be placed with caution in children because of the concern of postsurgical dislocation.[6] This paper is an extension and long-term follow-up of a previously published cohort.

METHODS

PRIOR TO INITIATION OF THIS STUDY, INSTITUTIONAL REview board approval was obtained from the Baylor College of Medicine for this retrospective study. A comprehensive database search of our electronic medical record was performed for patients under the age of 18 who had received iris-sutured intraocular lenses between September 1, 2004 and September 30, 2007. No patients were excluded.

Intraocular lens calculations were performed in the operating room using immersion A-scan ultrasonography for axial length measurement, and keratometry was performed using a handheld keratometer. In the patients who had a

Accepted for publication Sep 18, 2015.
From the Department of Ophthalmology, Baylor College of Medicine (R.S., M.P.W., M.B.H.); and the Department of Ophthalmology and Pediatrics, Texas Children's Hospital and Baylor College of Medicine (C.G., L.K., K.G.Y.), Houston, Texas.
Inquiries to Kimberly G. Yen, Texas Childrens' Hospital, 6701 Fannin, Suite 610.25, Houston, TX 77005; e-mail: kgyen@texaschildrens.org

0002-9394/$36.00
http://dx.doi.org/10.1016/j.ajo.2015.09.025

concurrent lensectomy/vitrectomy procedure, insertion of the iris-sutured IOL occurred immediately after the pars plana vitrectomy procedure. In the patients who were aphakic owing to previous surgery, an anterior vitrectomy was performed prior to IOL insertion if there was vitreous in the pupillary axis.

The iris-suturing surgical approach has been described in our previous publication, but is described below.[7,8] Briefly, it was performed as follows by 1 of 2 surgeons (M.B.H., M.P.W.): when necessary, the pupil was first constricted by intracameral injection of acetylcholine. Paracenteses were then created at 11 o'clock and 5 o'clock (for the left eye) and 1 o'clock and 7 o'clock (for the right eye) and a temporal clear corneal incision was made for insertion of a manually folded PCIOL. All eyes received 1 of 2 similar 3-piece foldable PCIOLs (the Alcon MA60AC [Alcon Laboratories Inc., Fort Worth, TX] or the AMO AR40e [Abbott Medical Optics Inc., Bloomington, MN]). The type of lens used was dictated by availability at the facility where the surgery was performed and surgeon choice. The lens was manually folded in a moustache configuration and inserted through the temporal incision with the haptics placed under the iris and the optic captured in the pupil. A McCannel suture using either 9-0 or 10-0 prolene with a long, curved needle was passed through the iris, capturing the haptic, and back up through the iris. The ends of the prolene were externalized through the paracentesis located over and closest to the haptic and the haptic was secured to the iris. Later in our series, the haptics were secured to the iris with a modified Siepser sliding knot.[9,10] The optic was then pushed behind the iris and the temporal wound was sutured using 10-0 nylon. Sutures were positioned so they were two-thirds of the distance from the distal end of the haptic in the midperipheral iris and this was confirmed by visual inspection.

Postoperatively, all eyes were treated with topical gatifloxacin and prednisolone acetate 1% 4 times daily for the first week followed by a taper of the topical prednisolone acetate 1% by 1 drop each week for 4 weeks. All patients whose PCIOLs dislocated during the period of this study underwent retrieval and resuturing of the IOL to the iris. In these cases, if only 1 haptic had dislocated and the PCIOL was visible at the slit-lamp examination without posterior segment examination, the PCIOL was brought forward by a Sinskey hook by an anterior segment surgeon. If the entire PCIOL was dislocated or if only 1 haptic had dislocated and the PCIOL was not easily seen at the slit lamp, the PCIOL was retrieved through a pars plana vitrectomy by a retinal surgeon. In all cases, the optic was then prolapsed through the pupil after the PCIOL had been brought forward. The dislocated haptic or haptics were then resutured with a modified Siepser sliding knot,[9,10] using the technique described above. The optic was then prolapsed posterior to the iris.

All children received complete preoperative and postoperative ophthalmic evaluations, including age-appropriate assessment of visual acuity (Snellen, Allen, HOTV, tumbling E, or fix-and-follow), refraction (cycloplegic refraction if not aphakic), slit-lamp examination, intraocular pressure measurement (if cooperative in clinic), and dilated funduscopy. All patients underwent examination under anesthesia, including intraocular pressure measurement, prior to surgery if this information could not be accurately obtained in clinic. Subject parameters reviewed included sex; age; relevant medical history; preoperative, postoperative, and most recent visual acuities; presence of amblyopia; length of follow-up; need for reintervention; and, when appropriate, time from lens placement to reintervention. Snellen visual acuities were converted to logarithm of minimal angle of resolution values for statistical analysis. Changes in visual acuity of 1 or more lines on a standard visual acuity chart or analogous changes (ie, a patient with only light perception preoperatively with the ability to count fingers postoperatively) were considered significant. Descriptive statistics and the 2-tailed Fisher exact test were used to determine significance and compare subgroups. Significance was defined by a P value of .05 or less.

RESULTS

SEVENTEEN EYES IN 12 PATIENTS MET THE CRITERIA FOR INclusion. Five of the patients were female. Five patients (29%) had Marfan-associated ectopia lentis. Six patients (35%) had congenital or idiopathic ectopia lentis not associated with Marfan syndrome. Four patients (24%) suffered from traumatic cataracts. Two patients (12%) were aphakic after previous pars plana vitrectomy and lensectomy for their cataracts, which presented during infancy.

The mean age at the time of the PCIOL implantation was 7.21 ± 3.78 years (median, 5.76 years; range, 1.9–15 years), and the average length of follow-up was 4.69 ± 3.21 years (range, .08–9.56 years). Fifty percent of the patients were treated for amblyopia. Detailed individual patient data are given in Table 1.

There were no intraoperative complications. Since the initial paper, 2 additional eyes had dislocation of their IOLs, bringing the total to 7 of 17 eyes (41%). The dislocations occurred a mean of 12.11 ± 11.97 months from initial surgery (median, 6 months; range, 1.6–33.3 months). The follow-up time for 3 eyes (Eyes 10, 11, and 16) was exceptionally low. Given the mean dislocation time, if these 3 eyes are excluded, the dislocation rate jumps to 50%. Of the 7 dislocations, 2 occurred in patients with Marfan-associated ectopia lentis, 2 occurred in patients with hereditary ectopia lentis, 1 occurred in a patient with idiopathic lens subluxation, 1 occurred in a patient with traumatic cataract, and 1 occurred in a patient with aphakia following a pars plana vitrectomy-lensectomy for retinal hemorrhage at 1 month of age. There was a higher rate of dislocation in patients with a history of ectopia lentis than in patients being treated for aphakia resulting from other causes (71% vs